CLAIMS

We claim:

1. A light-emitting device with a current blocking structure, comprising:

a substrate;

an epitaxial structure positioned on the substrate, wherein the epitaxial structure includes a bottom cladding layer, an upper cladding layer, a light-emitting layer positioned between the bottom cladding layer and the upper cladding layer, and a window layer positioned on the upper cladding layer;

an ohmic contact electrode positioned on the epitaxial structure; and

a current blocking structure positioned inside the epitaxial structure, wherein the current blocking structure extends from a region below the ohmic contact electrode at least to the light-emitting layer.

2. The light-emitting device with a current blocking structure of Claim 1, further comprising a contact layer positioned between the window layer and the ohmic contact electrode for spreading current laterally.

3. The light-emitting device with a current blocking structure of Claim 1, wherein the current blocking structure extends to the bottom cladding layer.

4. The light-emitting device with a current blocking structure of Claim 1, wherein the area of the current blocking structure is smaller than that of the ohmic contact electrode.

5. The light-emitting device with a current blocking structure of Claim 1, wherein the current blocking structure extends from the bottom surface of the ohmic contact electrode.

6. A method for making a light-emitting device with a current blocking structure, comprising the steps of:

forming an epitaxial structure on a substrate, wherein the epitaxial structure includes a bottom cladding layer, an upper cladding layer, a light-emitting layer positioned between the bottom cladding layer and the upper cladding layer, and a window layer positioned on the upper cladding layer;

forming a photoresist layer with at least one opening on the epitaxial structure;

performing at least one ionic implanting process to form a current blocking structure inside the epitaxial structure;

removing the photoresist layer; and

forming an ohmic contact electrode on the epitaxial structure.

7. The method for making a light-emitting device with a current blocking structure of Claim 6, wherein the ionic implanting process implants a proton beam with a predetermined energy and dosage into the epitaxial structure.

8. The method for making a light-emitting device with a current blocking structure of Claim 7, wherein the predetermined dosage is between 1×10^{12} and 1×10^{16} dopant/cm^2.

9. The method for making a light-emitting device with a current blocking structure of Claim 7, wherein the predetermined energy is between 100 and 1000 keV.

10. The method for making a light-emitting device with a current blocking structure of Claim 6, wherein the ionic implanting process implants a plurality of proton beams with different energies into the epitaxial structure.

11. The method for making a light-emitting device with a current blocking structure of Claim 6, wherein the ionic implanting process uses a dopant selected from the group consisting of proton, nitrogen ion and oxygen ion.

12. A method for making a light-emitting device with a current blocking structure, comprising the steps of:

forming an epitaxial structure on a substrate, wherein the epitaxial structure includes a bottom cladding layer, an upper cladding layer, a light-emitting layer positioned between the bottom cladding layer and the upper cladding layer, and a window layer positioned on the upper cladding layer;

forming an ohmic contact electrode on the epitaxial structure;

forming a photoresist layer with at least one opening on the epitaxial structure; and

performing at least one ionic implanting process to form a current blocking structure in the epitaxial structure.

13. The method for making a light-emitting device with a current blocking structure of Claim 12, wherein the ionic implanting process implants a proton beam with a predetermined energy and dosage into the epitaxial structure.

14. The method for making a light-emitting device with a current blocking structure of Claim 13, wherein the predetermined dosage is between 1×10^{12} and 1×10^{16} dopant/cm^2.

15. The method for making a light-emitting device with a current blocking structure of Claim 13, wherein the predetermined energy is between 100 and 1000 keV.

16. The method for making a light-emitting device with a current blocking structure of Claim 12, wherein the ionic implanting process implants a plurality of proton beams with different energies into the epitaxial structure.

17. The method for making a light-emitting device with a current blocking structure of Claim 12, wherein the ionic implanting process uses a dopant selected from the group consisting of proton, nitrogen ion and oxygen ion.